

TECHNICAL STATEMENT

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This technical statement addresses requests for pioneer's preferences filed by Constellation Communications, Inc. ("Constellation"), Ellipsat Corporation ("Ellipsat"), Loral Qualcomm Satellite Services, Inc. ("Loral"), Motorola Satellite Communications, Inc. ("MSCI"), and TRW Inc. ("TRW"). These applicants seek pioneer's preferences for their proposals to operate satellite systems essentially designed to provide Mobile Satellite Service ("MSS") in the bands presently allocated domestically to the Radiodetermination Satellite Service ("RDSS").

Constellation, Ellipsat, Loral, MSCI and TRW contend that their proposed systems are each sufficiently innovative to warrant a pioneer's preference. However, as Ellipsat concedes in its request, small satellite technology and non-geostationary satellite orbits (including elliptical orbits) are concepts which were not developed by these applicants, but have been used for communications by the military and scientific communities for a number of years.^{1/} Thus, the concept of providing Mobile Satellite Service via constellations of non-geostationary satellites is not a technological innovation.

Loral describes as "innovative and unique" a number of aspects of its system and satellite design. First, Loral cites

^{1/} Ellipsat Request for Pioneer's Preference (July 29, 1991), at 2 n.5. For example, the COSPAS/SARSAT MSS system employs LEO satellites at VHF, UHF and L-band frequencies.

to its system's interoperability with the public switched telephone network ("PSTN") and system architecture features such as call set-up mechanisms, user validation, and "soft" call hand-offs. These, however, are routine elements that are necessary to any mobile satellite systems. Furthermore, each of these elements as proposed by Loral is incorporated in MSS systems being built by AMSC, TMI and Inmarsat, as well as in terrestrial cellular systems that currently are being operated. Thus, Loral cannot claim any of these system features to be technological innovations.

Loral also cites to various aspects of its satellite and system design, specifically: (a) configuration of eight satellites per orbital plane at 1389 kilometers altitude; (b) spot beams that form coverage cells aligned with the velocity vector of the satellite; (c) call hand-off protocols; (d) use of a pilot channel to obtain synchronization of receivers; and (e) antennas which can shape gain to provide compensation of user-to-satellite range. However, none of these aspects represents any technological innovation.

- o The number of satellites per plane and orbital altitudes proposed by Loral are "innovative" only in that they reflect Loral's chosen method of providing coverage of the U.S. Loral's proposed configuration offers no particular advantages over any other choice of satellite and orbital plane structure and thus does not represent any innovation.
- o The objective and approach of Loral's proposed spot beam alignment are virtually identical to those for the fan beam utilized on NASA's ATS-6 satellite. That satellite, which was operated in the 1970's, similarly aligned its spot beams with the velocity vectors of

aircraft users to maximize the coverage time of the beam.

- o The use of call hand-off protocols is a necessary element of any mobile satellite or terrestrial cellular system. Having such protocols is not technologically revolutionary, and Loral has not shown how its particular protocols are innovative in any respect.
- o Loral's proposed use of a pilot signal for synchronization of receivers is a technology no different than the existing use of subcarrier transmission; for example, the use of subcarriers by broadcast stations via an SCA. This technology has been in use for decades.
- o Loral's proposal to compensate for user-to-satellite range by shaping antenna gain is not new. This technique has already been used on low-Earth orbit satellites such as the series first launched by the National Oceanic and Atmospheric Administration ("NOAA") in the 1970's (for example, NOAA's High Resolution Picture Transmission antenna).

Finally, Loral claims that its system will utilize "innovative" CDMA techniques for frequency reuse and compression of signals into the same beam. These capabilities, however, are fundamentally available in any system employing CDMA. CDMA, of course, is a technique that has existed for some time. The underlying spread spectrum modulation was developed by the Department of the Army in the 1940's and later applied in military CDMA satellite systems in the 1970's. CDMA is presently being utilized by a number of satellite systems, among them the GPS and Glonass radionavigation systems. Loral points out no specifically innovative CDMA features that it has developed for use in its proposed system.

MSCI states that its system will employ an innovative cellular design and spot beam technology. However, this

technology does not represent a significant or new technological achievement. It was AMSC that first proposed implementation of frequency reuse using spot beams. MSCI also refers to its proposed system's use of intersatellite links and bidirectional capabilities. However, for more than a decade, the National Aeronautics and Space Administration ("NASA") has been operating intersatellite links in its TDRSS system. Intersatellite links are also in use by military satellite systems. Finally, while MSCI's proposal for bidirectional operation has not previously been proposed by a satellite system, such operation will provide no benefits in spectrum efficiency. In fact, MSCI's bidirectional operation is likely to reduce its system's capacity, and will exacerbate the interference MSCI's system will cause to other users of the RDSS bands.

DECLARATION

I, Thomas M. Sullivan, do hereby declare as follows:

1. I have a Bachelor of Science degree in Electrical Engineering and have taken numerous post-graduate courses in Physics and Electrical Engineering.

2. I am presently employed by Atlantic Research Corporation and was formerly employed by the IIT Research Institute, DoD Electromagnetic Compatibility Analysis Center.

3. I am qualified to evaluate the technical information in AMSC Subsidiary Corporation's Consolidated Opposition to Requests for Pioneer's Preference and the Technical Statement therein. I am familiar with Part 25 and other relevant parts of the Commission's Rules and Regulations.

4. I received, in 1982, an official commendation from the Department of the Army for the establishment of international provisions for the worldwide operation of mobile earth stations.

5. I served as Technical Advisor to the U.S. Delegation to WARC-92 and participated in sessions of WARC-92 addressing frequency sharing and other aspects of MSS.

6. I have been involved in the preparation of and have reviewed AMSC Subsidiary Corporation's Consolidated Opposition to Requests for Pioneer's Preference and the Technical Statement therein. The technical facts contained therein are accurate to the best of my knowledge and belief.

Under penalty of perjury, the foregoing is true and correct.

April 8, 1992
Date

Thomas M. Sullivan
Thomas M. Sullivan

CERTIFICATE OF SERVICE

I, Jacqueline L. Mateo, a secretary in the law firm of Fisher, Wayland, Cooper and Leader, hereby certify that true copies of the foregoing "Consolidation Opposition to Requests for Pioneer's Preference" were sent this 8th day of April 1992, by first class United States mail, postage prepaid, to the following:

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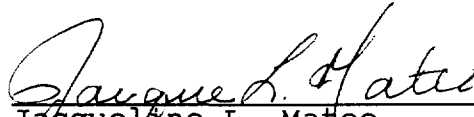
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